

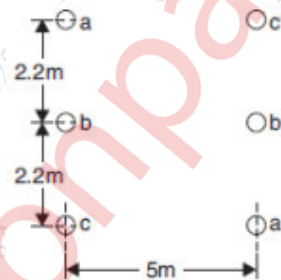
Duration – 3 Hours

Total Marks - 80

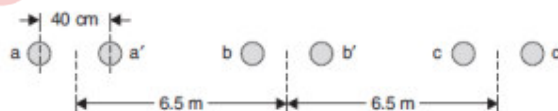
- N.B.:** - (1) Question No.1 is compulsory.
 (2) **Attempt** any **Three** questions out of the remaining **five** questions.
 (3) Assume suitable data if necessary and justify the same.

Q 1. **Answer any four questions.**

- A) Discuss in details skin effect with a neat diagram **05**
 B) State the advantages and disadvantages of Solar cell power generation **05**
 C) State the advantages of Suspension type insulators **05**
 D) Define string efficiency? Illustrate the any one method of improving string efficiency **05**
 E) Discuss one line diagram along with its advantages. **05**
 Q 2 a) Derive the inductance of single phase two wire transmission line. **10**
 Q 2 b) A 3-phase double circuit line is shown in Fig. The diameter of each conductor is 2 cm. Determine the capacitance and charging current for a 200km length of the line, assume that the line is transposed and the operating voltage 220 kV. **10**



- Q 3 a) A single circuit 460 kV line using two bundle conductors per phase as shown in Fig. The dia. of each conductor is 5.0 cm. determine, inductance per phase per km. **10**



- Q 3 b) Derive the expression for capacitance of three phase transmission line with unsymmetrical spacing **10**
 Q 4 a) Draw the equivalent circuit representation and phasor diagram of a medium transmission line in Nominal pi method. Derive the expressions for its A, B, C, D constants also, analyse its validity for two port network. **10**
 Q 4 b) A 3-phase line 3 km long delivers 3000 kW at a p.f. 0.8 lagging to a load. The resistance and reactance per km of each conductor are 0.4 Ω and 0.3 Ω respectively. If the voltage at the supply end is maintained at 11 kV, calculate: (i) receiving end voltage (line-to-line) and (ii) Transmission efficiency **10**

- Q 5 a) Develop the expression of string efficiency for 2 disc insulators string. **10**
- Q 5 b) The three bus-bar conductors in an outdoor substation are supported by units of post type insulators. Each unit consists of a stack of 3 pin type insulators fixed one on the top of the other. The voltage across the lowest insulator is 13.1 kV and that across the next unit is 11 kV. Find the bus-bar voltage of the station. Also calculate the string efficiency **10**
- Q 6 a) Write short note on following (i) step and touch potential (ii) neutral grounding and its method. **10**
- Q 6 b) Figure shows one-line diagram of a power system. Draw impedance diagram of the network. Choose a base of 50MVA, 33kV for generator. Ratings of the equipment are: **10**
- Generator: 50 MVA, 33kV, $X'' = 20\%$
 Syn. Motor: 50 MVA, 11kV, $X'' = 30\%$
 Transformer T1: 50 MVA, 33/220kV, $X = 15\%$
 Transformer T2: 50 MVA, 11/220kV, $X = 15\%$

